Enhancing Aircraft Survivability

Combat Survivability Division

National Defense Industrial Association

Monterey, California

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Mission

Combat Survivability Division
National Defense Industrial Association

" To enhance survivability as an essential element of overall combat mission effectiveness "

Supporting Goals

- Enhance survivability technology base and information exchange
- Foster innovative solutions to survivability challenges
- Work toward a balanced design approach to survivability
- Maintain survivability as an aircraft design discipline
- Improve battle damage repair capability
- Promote realism in assessments, simulations, testing
- Increase awareness of survivability issues by senior officials

Our Organization

- **All volunteer group from industry, government, and academia**

- **Governed by an Executive Board representative of the broad survivability community**

- **Work accomplished through committees**
  - **Strategic Planning**
  - **Symposium Program (ad hoc for each event)**
  - **Awards**
  - ***Steering***
  - ***Technology Interchange***
  - ***Communications***
  - ***Senior Advisory Council***

- **Welcome participation by friends of survivability, both civil and military-related**
  - **Join the association**
  - **Let us know about your interest**

What We Do

- Symposiums
  - ◇ 1989 – General Survivability
  - ◇ 1990 – Low Observables
  - ◇ 1991 – Battle Damage Repair
  - ◇ 1993 – Transport Aircraft Survivability, Civil and Military
  - ◇ 1994 – Testing for Combat Survivability
  - ◇ 1996 – Impact of Low Observable Technology
  - ◇ 1997 – Vulnerability Reduction Technology

- Future symposiums at Monterey
  - ◇ August 1998 -- Countermeasures & Low Observables: Complementary Capabilities
  - ◇ November 1999 -- General Survivability

- Topical "Quick Looks"
  - ◇ Highly focused one day reviews or workshops
  - ◇ Under consideration

Aircraft Survivability – What Does it Mean?

Department of Defense definition:

> **" The capability of an aircraft to avoid or withstand man-made hostile environments without suffering an abortive impairment of its ability to accomplish its designated mission "**

Survivability's twin elements:

- **Susceptibility Reduction – reducing the probability of hit [*or internal explosion*]**
- **Vulnerability Reduction – mitigating damage in the event of a hit [*or explosion*]**

Survivability Means Different Things to Different People

- Defense suppression
- Signature reduction, stealth
- Countermeasures, decoys, deception
- Locating and acquiring the target
- Stand-off weapons
- Tactics – speed, maneuver, altitude, routing; and training
- Avoiding low altitude during daylight
- Unmanning – using unmanned aerial vehicles and cruise missiles
- Just not going there
- Passenger and baggage screening

- Damage resistance, damage tolerance, armor plate
- Testing
- Battle damage repair, force reconstitution

<u>Isn't survivability about all of these?</u>

A Big Question

Preface:

- **We've come a long way in aircraft survivability in the last 25 years**
- **There is much to take pride in**
- **So, some say, special focus is no longer needed. Why not reallocate scarce resources elsewhere?**

<u>The Question:</u>

" Is a special, disciplined focus on aircraft survivability still needed, since to some people, survivability is already firmly embedded in both the requirements process and aircraft design? "

The right answer:

" <u>Yes !</u> Special attention is still needed. <u>But</u>, . . . advocates must become more active since much associated with traditional survivability is seen as 'old hat' and not relevant to the challenges of today and tomorrow "

State of Survivability Community and Discipline

Some Observations

- "Corporate memory" is fading
  - Fewer officers with experience in wars against resolute, capable foes
  - Downsizing in industry and government, company mergers, survivability pioneers retiring
- Countermeasures community and general survivability remain largely separate
- Stealth is seen as the answer to most military survivability needs
- Increasing interest by civil aviation in survivability issues, and in fire and explosion safety
- No serious movement to develop a credible, overall survivability assessment capability
- Little activity in vulnerability reduction R&D – despite live fire test law, airline incidents

Civil-Military Aircraft Fire and Explosion Mitigation Project

- Build on current individual and limited cooperative efforts
  - DoD's Next Generation Fire Suppression Program
  - FAA Technical Center work
  - DoD's Safety and Survivability of Aircraft Initiative, ... and others
- Issues to examine:
  - Character of fires / explosions and causes of initiation
  - Characterization of fuels and other flammable liquids, by type
  - Fire detection and suppression systems, explosion mitigation techniques
  - Improved modeling and analysis tools for predicting fires and explosions
  - Designing aircraft with reduced vulnerability to fire and explosion, ... and others
- Participants
  - FAA, NTSB, NASA, Europe's Joint Aviation Authorities (JAA)
  - Department of Defense components and agencies, NATO member air forces
  - Airframe and engine manufacturers, airline companies, universities
- Structure like DoD's Integrated High Performance Turbine Engine Tech program (IHPTET)
  - Clearly defined technical and timeline goals
  - Government-industry partnering
  - Stable funding profile
- Make project a U.S. national priority, ... and encourage others to join

Three Worthy Near Term Goals

1. **Assessments**

   Develop a credible capability to assess the impact of the several contributors to aircraft survivability, thereby facilitating sound design and procurement decisions, and the best use of scarce resources

2. **Countermeasures**

   Bring the countermeasures and general survivability communities closer together to a point where they are viewed as one

3. **Vulnerability Reduction**

   Resuscitate the increasingly moribund vulnerability reduction technology base – breathe some life into it! Why not start with the Civil-Military Fire and Explosion Mitigation Project?